උතුරු පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව

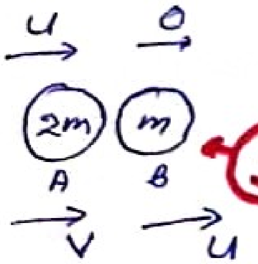
13 ශ්‍රේණිය වාර ප්‍රගමන පරීක්ෂණය - 2026

සංයුක්ත ගණිතය - II

ලකුණු දීමේ පටිපාටිය

A - කොටස

①



ගැටුමට පෙර A හි ප්‍රවේගය u ලෙස ගනිමු. ⑤

ගැටුමෙන් පසු A හි ප්‍රවේගය v යැයි ගනිමු.

ග:ස: හි යෙදීමෙන්

$$2\cancel{m}v + \cancel{m}u = 2\cancel{m}u \quad ⑤$$

$$v = \frac{u}{2}$$

නි.ප්‍ර: නියමය යෙදීමෙන්

~~mu - 2mv~~

$$v - u = -e(u-0) \quad ⑤$$

$$\frac{u}{2} - u = -eu$$

$$e = \frac{1}{2}$$

හානිවන චා:ශ: $= \frac{1}{2}\cdot 2m\cdot u^2 - \frac{1}{2}\cdot 2m\cdot\frac{u^2}{4} - \frac{1}{2}mu^2$ ⑤

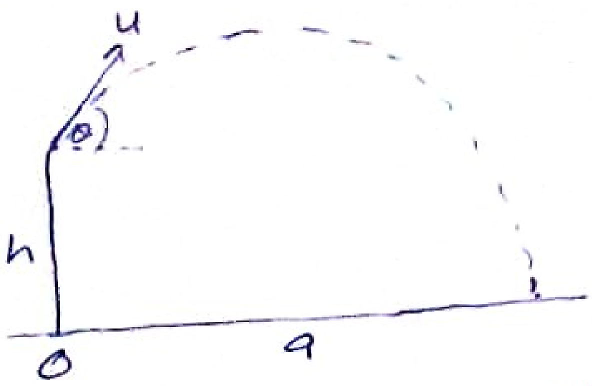
$$= \frac{1}{2}mu^2\left(2 - \frac{1}{2} - 1\right)$$

$$= \frac{1}{2}mu^2\cdot\frac{1}{2}$$

$= ($ගැටුමෙන් පසු B හි චා.ශ.$)\cdot\frac{1}{2}$ ⑤

25

②



$s = ut + \frac{1}{2}at^2$

$\rightarrow \quad a = u\cos\theta \cdot t + 0$

$t = \frac{a}{u\cos\theta}$ ⑤

$\uparrow \quad -h = u\sin\theta \cdot \frac{a}{u\cos\theta} - \frac{1}{2}g \cdot \frac{a^2}{u^2\cos^2\theta}$ ⑤ ⑤

$-h = a\tan\theta - \frac{ga^2}{2u^2}(1+\tan^2\theta)$

$-\frac{2u^2h}{ga^2} = \frac{2u^2}{ga}\tan\theta - 1 - \tan^2\theta$ ⑤

$\tan^2\theta - \frac{2u^2}{ga}\tan\theta + 1 - \frac{2u^2h}{ga^2} = 0$ //

θ සඳහා ගත හැකි අගයන් ලෙස θ₁ හා θ₂ tanθ₁ හා tanθ₂ සමීකරණයේ මූල වේ.

$\tan\theta_1 + \tan\theta_2 = \frac{2u^2}{ga}$ //

⑤

25

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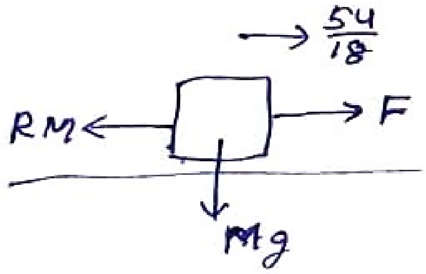
③



$F = ma \quad \rightarrow$

$F - RM = M \cdot 0$

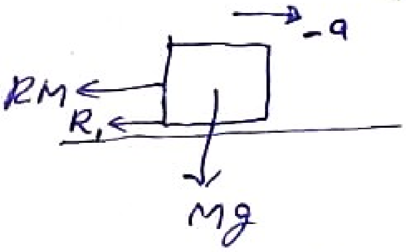
$F = RM$ ⑤

$H = PV$

$1000P = RM \cdot \frac{54}{18}$ ⑤

$\frac{3600P}{MU} = R$

$4\,kmh^{-1} = \frac{4 \times 1000}{3600} = \frac{54}{18}\,ms^{-1}$ ⑤



$\rightarrow \quad F = ma$

$-R_1 - MR = M(-a)$

$a = \frac{R_1 + MR}{M}$ ⑤

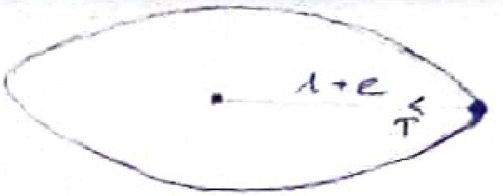
$\rightarrow \quad v^2 = u^2 + 2as$

$0 = \frac{254^2}{324} - 2\times5\left(\frac{R_1 + MR}{M}\right)$

$R_1 = \frac{54^2M}{648} - \frac{3600P}{4}$ ⑤

25

④



$\theta = \omega t$

$2\pi n = \omega 1$ ⑤

$\omega = 2\pi n$ //

$\leftarrow$ $F = ma$

$T = m(l+e)\omega^2$ ⑤

$\frac{\lambda e}{l} = m(l+e)4\pi^2 n^2$

$(\lambda - 4\pi^2 n^2 l m)e = 4\pi^2 n^2 l^2 m$ ⑤

$e = \frac{4\pi^2 n^2 l^2 m}{\lambda - 4\pi^2 n^2 m l}$ //

$T = \lambda \frac{e}{l}$

$= \frac{\lambda}{l} \cdot \frac{4\pi^2 n^2 l^2 m}{\lambda - 4\pi^2 n^2 m l}$ ⑤

$T = \frac{4\pi^2 n^2 l m \lambda}{\lambda - 4\pi^2 n^2 m l}$ // ⑤

25

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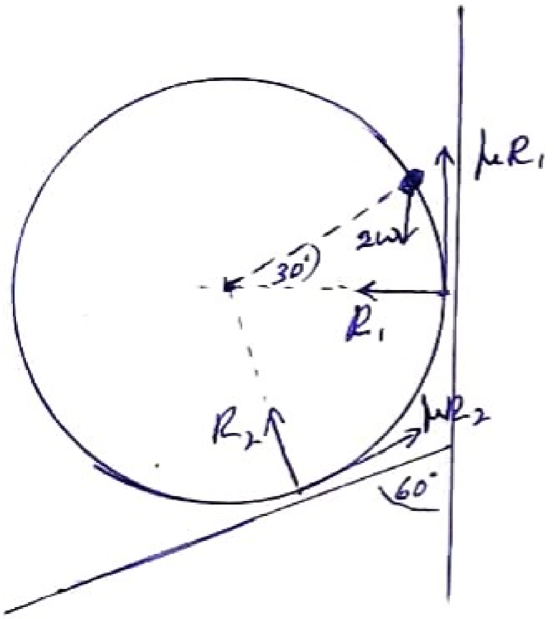
⑤



$\rightarrow$

$\mu R_2 \cdot \frac{\sqrt{3}}{2} - R_2 \cdot \frac{1}{2} - R_1 = 0$ ⑤

$R_2(\sqrt{3}\mu - 1) = 2R_1$ — ①

$\uparrow$ $\mu R_1 - 2w + R_2 \frac{\sqrt{3}}{2} + \mu R_2 \cdot \frac{1}{2} = 0$ ⑤

$2\mu R_1 + R_2(\sqrt{3} + \mu) = 4w$ — ②

$\mu R_2(\sqrt{3}\mu - \cancel{1}) + R_2(\sqrt{3} + \cancel{\mu}) = 4w$

$R_2(\sqrt{3}\mu^2 + \sqrt{3}) = 4w$

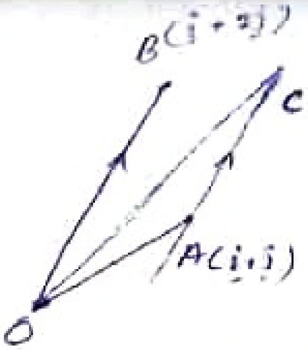
$R_2 = \frac{4w}{\sqrt{3}(\mu^2+1)}$ ⑤ //

① න් $2R_1 = \frac{4w}{\sqrt{3}(\mu^2+1)} \cdot (\sqrt{3}\mu - 1)$ ⑤

$R_1 = \frac{2w(\sqrt{3}\mu - 1)}{\sqrt{3}(\mu^2+1)}$ ⑤ //

25

⑥



$\overrightarrow{AB} = \underline{i}+2\underline{j} - (\underline{i}+\underline{j})$
$= \underline{j}$ ⑤

$\overrightarrow{AC} = \lambda\overrightarrow{OB} = \lambda\underline{i} + 2\lambda\underline{j}$

$\overrightarrow{OC} = \overrightarrow{OA} + \overrightarrow{AC}$
$= \underline{i}+\underline{j} + \lambda\underline{i} + 2\lambda\underline{j}$ ⑤
$= (1+\lambda)\underline{i} + (1+2\lambda)\underline{j}$

$\overrightarrow{CB} = \overrightarrow{CO} + \overrightarrow{OB}$
$= -(1+\lambda)\underline{i} - (1+2\lambda)\underline{j} + \underline{i} + 2\underline{j}$
$= -\lambda\underline{i} + (1-2\lambda)\underline{j}$

$\overrightarrow{OC} = \frac{7}{5}\underline{i} + \frac{9}{5}\underline{j}$ ⑤

$AC \perp CB$ නිසා
$\overrightarrow{AC}\cdot\overrightarrow{CB} = 0$ ⑤
$(\lambda\underline{i}+2\lambda\underline{j})\cdot(-\lambda\underline{i}+(1-2\lambda)\underline{j}) = 0$
$-\lambda^2 + 2\lambda(1-2\lambda) = 0$
$-5\lambda^2 + 2\lambda = 0$
C හා A සම්පාත නොවන නිසා
$\lambda = 0$ විසඳුම නොගැනේ.
$\lambda = \frac{2}{5}$ ⑤

25

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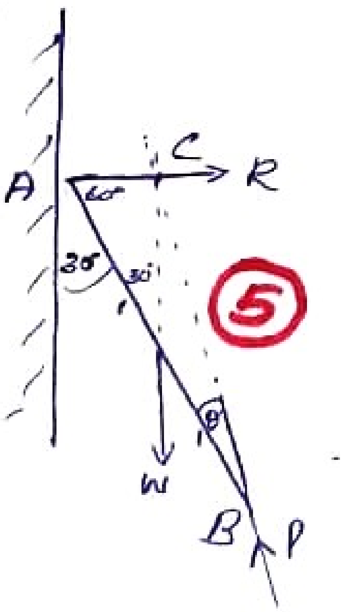
⑦



⑤

දණ්ඩ මත ක්‍රියාකරන බල සමතුලිත
නිසා එම බල ක්‍රියාරේඛා තුන ඒක
ලක්ෂ්‍ය විය යුතුය.

P හා දණ්ඩ අතර කෝණය θ නම්
ABC Δ ය Cot ප්‍රමේය ⑤
යෙදීමෙන්

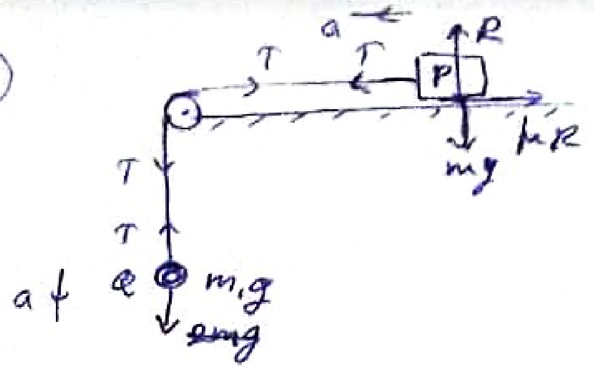
$\cot\theta - \cot 60° = 2\cot 30°$
$\cot\theta = 2\sqrt{3} + \frac{1}{\sqrt{3}}$
$\cot\theta = \frac{7}{\sqrt{3}}$ ⑤
$\tan\theta = \frac{\sqrt{3}}{7}$
$\theta = \tan^{-1}\frac{\sqrt{3}}{7}$

$A\circlearrowright = 0$
$P.2a\sin\theta - W.a\sin 30 = 0$ ⑤
$2P.\frac{\sqrt{3}}{\sqrt{52}} - \frac{W}{2} = 0$
$P = \frac{\sqrt{13}\,W}{2\sqrt{3}}$ ⑤

25

Scanned with ACE Scanner

⑧



$$T = \frac{2mg(\mu+1)}{3}$$

P ට ↑ $F = ma$ ⑤

$R - mg = m\cdot 0$

$R = mg$

P ට ← $T - \mu R = ma$ —① Q ට ↓ $m_1 g - T = m_1 a$ —② ⑤

$\frac{①}{②}$ $$\frac{\frac{2mg(\mu+1)}{3} - \mu mg}{m_1 g - \frac{2mg(\mu+1)}{3}} = \frac{m}{m_1}$$ ⑤ T ආදේශයට ⑤

$$\frac{2\cancel{g}(\mu+1) - 3\cancel{g}\mu}{3m_1\cancel{g} - 2m\cancel{g}(\mu+1)} = \frac{1}{m_1}$$

$$m_1(2-\mu) = 3m_1 - 2m(\mu+1)$$

$$-m_1(\mu+1) = -2m(\mu+1)$$

$$m_1 = 2m \,//$$ ⑤

25

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⑨ අලුත් රෝගියකු වීම A නම් $P(A) = \frac{15}{100} = \frac{3}{20}$ ⑤

කෝවිඩ් ආසාදිත B නම් $P(B) = \frac{30}{100} = \frac{3}{10}$ ⑤

$$P(A \cap B) = \frac{6}{100} = \frac{3}{50}$$ ⑤

$$P(A/B) = \frac{P(A \cap B)}{P(B)}$$

$$= \frac{3/50}{3/10} = \frac{1}{5} \,//$$ ⑤

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{3}{20} + \frac{3}{10} - \frac{3}{50}$$

$$= \frac{39}{100} \,//$$ ⑤

25

⑩ a b c d e f

$\frac{c+d}{2} = 5$ $f = 8$ $a = 2$ ⑤

$c + d = 10$ ⑤

මාතය 5 නිසා $c = 5$ හා $d = 5$ විය යුතුය ⑤

2, b, 5, 5, e, 8

b = 3 හෝ 4 ද e = 6 හෝ 7 ද විය යුතුය

2, 3, 5, 5, 6, 8 වල ~~[illegible]~~ මධ්‍යන්‍ය නොලැබේ.

2, 3, 5, 5, 7, 8 වල මධ්‍යන්‍ය 5 වේ ⑤

① — 2, 3, 5, 5, 7, 8 5 ලැබේ

b = 4 හා e = 6 වල)

අපගමනවල වර්ගවල මධ්‍යන්‍යය.

① න් $\frac{9+4+0+0+4+9}{6} = \frac{26}{6} = 13/3$ ⑤

උත්තරය 6

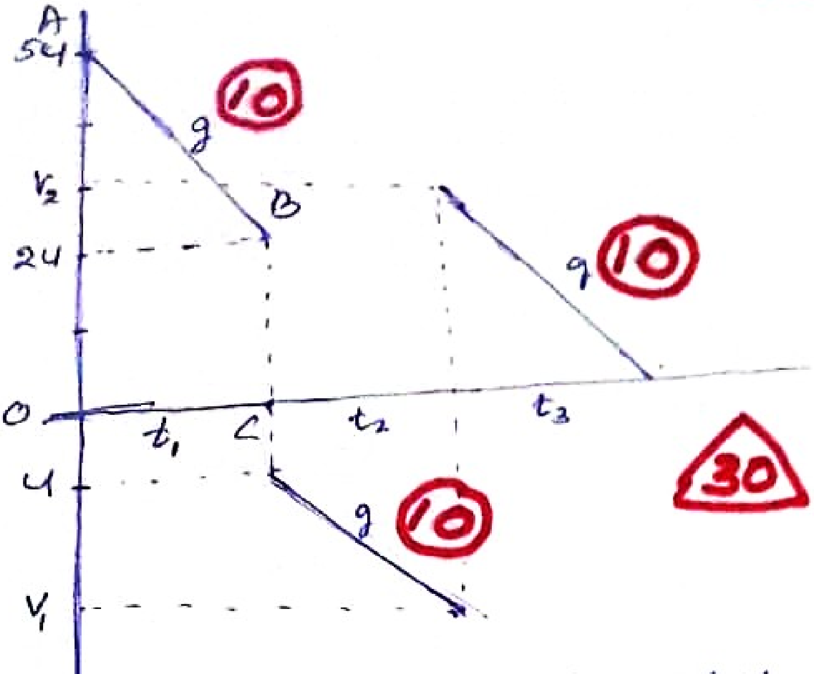
2, 3, 5, 5, 7, 8 වේ.

25

⑪ (a)

⑤ පිළිතුර $e = \frac{1}{2}$

(ඇතැම් ප්‍රශ්නපත්‍රවල
මුද්‍රිත දෝෂ යකි
සැලකීම)



30

$g = \frac{34}{t_1}$

$t_1 = \frac{34}{g}$ ⑤

පළමු උස = OABCD ව

$= \frac{1}{2} \cdot 74 \cdot \frac{34}{g}$

$= \frac{21u^2}{2g}$ ⑤

15

$g = \frac{v_2}{t_3}$

$t_3 = \frac{v_2}{g}$ ⑤

$\frac{21u^2}{2g} = \frac{1}{2} t_3 v_2$

$\frac{21u^2}{\cancel{2}g} = \frac{1}{\cancel{2}} t_3 \, g \, t_3$ ⑤

$t_3 = \frac{\sqrt{21}\,u}{g}$ //

10

බෝලය බිම සමඟ ප්‍රත්‍යාගති සංගුණකය e නම්

$v_2 = e v_1$

$g t_3 = e v_1$

$g \cdot \frac{\sqrt{21}\,u}{g} = e v_1$ ⑤

$e = \frac{\sqrt{21}\,u}{v_1}$

$e = \frac{\sqrt{21}\,u}{\sqrt{22}\,u}$

$e = \sqrt{\frac{21}{22}}$ ⑤ //

$g = \frac{v_1 - u}{t_2}$

$t_2 = \frac{v_1 - u}{g}$ ⑤

$\frac{21u^2}{2g} = \frac{1}{2}(v_1 + u)\frac{(v_1 - u)}{g}$ ⑤

$\frac{21u^2}{2g} = \frac{v_1^2 - u^2}{2g}$

$22u^2 = v_1^2$

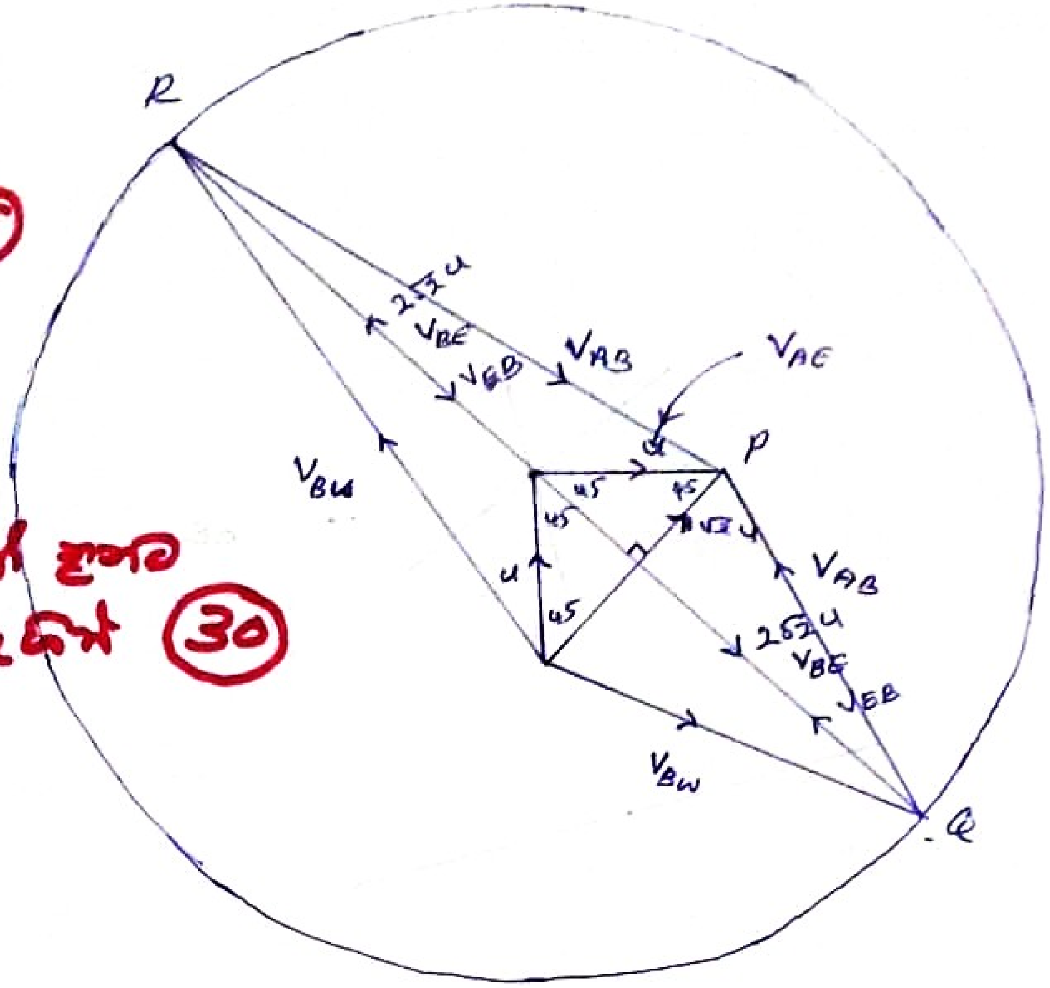
20

(11) (b)

$V_{AE} = \xrightarrow{u}$

$V_{BE} = 2\sqrt{2}u$ ⑤

$V_{WE} = \downarrow u$



ත්‍රිකෝණ 3ට
10 බැගින් ㉚

$V_{AW} = V_{AE} + V_{EW}$

$= \xrightarrow{u} + \uparrow u$ ⑤

$V_{BW} = V_{BE} + V_{EW}$

$= 2\sqrt{2}u + \uparrow u$ ⑤

B ගේ චලිතය සඳහා
ප්‍රවේග ත්‍රිකෝණ රේඛාව
[illegible]

$V_{AW} = \sqrt{2}u$ ⑤

$V_{AB} = V_{AE} + V_{EB}$ ⑤

$V_{AB} = \overrightarrow{QP}$

$= \left[(2\sqrt{2}u)^2 + u^2 - 2\cdot 2\sqrt{2}u\cdot u\cdot \cos 45^\circ\right]^{1/2}$

$= (9u^2 - 4u^2)^{1/2}$ ⑩

$= \sqrt{5}u$

$V_{AB} = \overrightarrow{RP}$

$= \{(2\sqrt{2}u)^2 + u^2 - 2\cdot 2\sqrt{2}u\cdot u\cdot \cos 135^\circ\}^{1/2}$

$= (9u^2 + 4u^2)^{1/2}$ ⑩

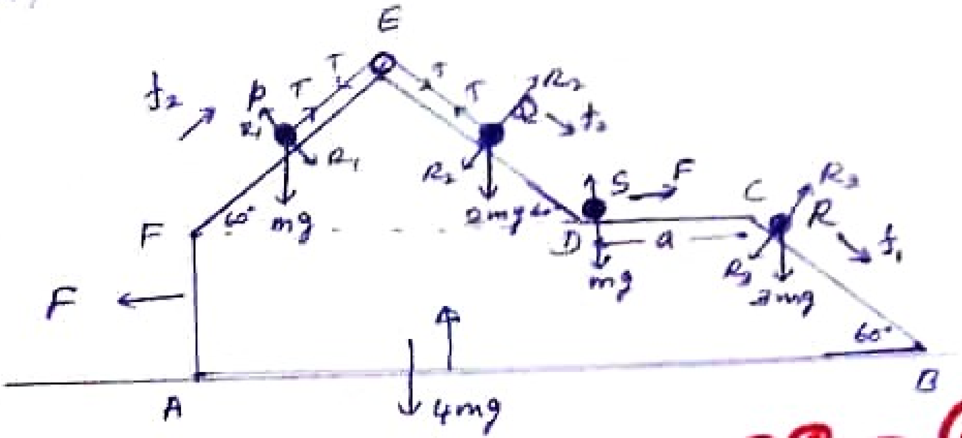
$= \sqrt{13}u$

75

150

Scanned with ACE Scanner

⑫ (a)



බල - ⑩
ත්වරණ - ⑩

F = ma යෙදීමෙන්

P ට ↗ $T - mg\frac{\sqrt{3}}{2} = m(f_2 - \frac{F}{2})$ —① ⑤ ⑤

Q ට ↘ $2mg\cdot\frac{\sqrt{3}}{2} - T = 2m(f_2 - \frac{F}{2})$ —② ⑤ ⑤

R ට ↘ $3mg\cdot\frac{\sqrt{3}}{2} = 3m(f_1 - \frac{F}{2})$ —③ ⑤ ⑤

පද්ධතියට ← $0 = 4mF + m(F - \frac{f_2}{2}) + 2m(F - \frac{f_2}{2}) + 3m(F - \frac{f_1}{2})$ —④ ⑤ ⑤ ⑤ ⑤

S 7ට්ය කුට්ටියට සාපේක්ෂව a දුරක් ගෙවීමට හා කුට්ටිය
එකම කාලයට a දුරක් ගෙවයි. ⑤

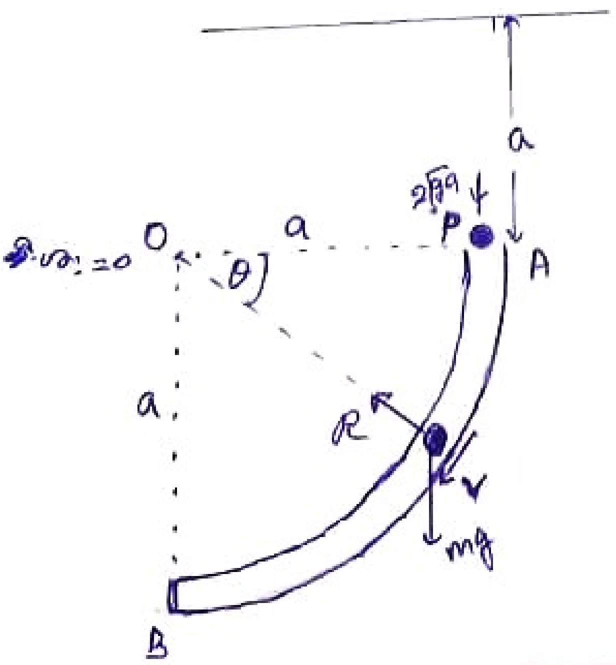
කුට්ටියට ← $S = ut + \frac{1}{2}at^2$ ⑤

$a = \frac{1}{2}Ft^2$

R ට ↘ $S = \frac{1}{2}\cdot f_1\cdot\frac{2a}{F}$ ⑤

△25

(b)



ශ:ස. සංස්ථිතියෙන්

$\frac{1}{2}mv^2 - mg\cdot a\sin\theta = \frac{1}{2}m\cdot 4ga + 0$ ⑤ ⑤

$v^2 = 2ga(2 + \sin\theta)$

↖ $F = ma$

$R - mg\sin\theta = \frac{m}{a}\cdot 2ga(2 + \sin\theta)$ ⑤ ⑤

$R = mg(4 + 3\sin\theta)$

△20

$\theta = \pi/2$ දී අංශුව B වෙත පැමිණේ ⑤

එවිට $v^2 = 2ga(2 + \sin \pi/2)$ ⑤

$v = \sqrt{6ga}$ ⑤

ආවේගයෙන් පසුව ප්‍රවේගය $\frac{5}{6}\sqrt{6ga} = 5\sqrt{\frac{ga}{6}}$ ⑤

ශක්ති සංස්ථිතිය අනුව A හා B ට ශ:සං:මූලධර්මය යෙදීමෙන්
B හිදී ප්‍රවේගය V_1 නම්

$$\frac{1}{2}\cancel{m}V_1^2 = \frac{1}{2}\cancel{m}\cdot\frac{25ga}{6} - \cancel{m}ga$$ ⑤ ⑤

$$V_1^2 = \frac{13ga}{6}$$ ⑤

A සිට සිරස් චලිතය

$$v^2 = u^2 + 2as$$

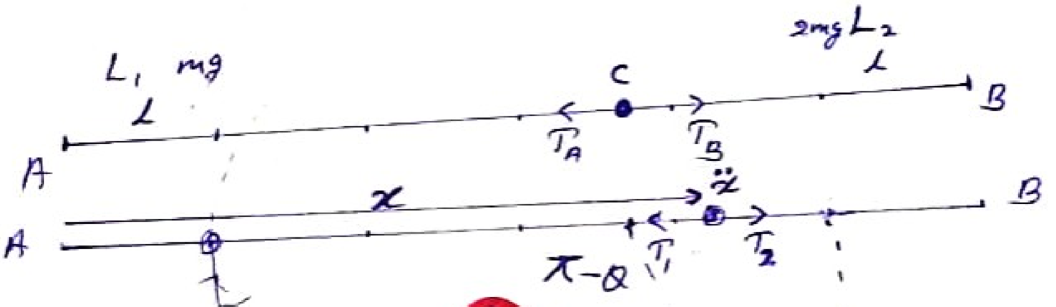
$$v^2 = \frac{13ga}{6} - 2ga$$ ⑤

$$v = \sqrt{\frac{ga}{6}}$$ ⑤

45

150

13



⑤

$\rightarrow F = ma$

$$T_2 - T_1 = m\ddot{x}$$ ⑤

$$\frac{2\cancel{m}g(5l - x)}{l} - \frac{\cancel{m}g(x - l)}{l} = \cancel{m}\ddot{x}$$ ⑤

$$-\frac{3g}{l}x + 11g = \ddot{x}$$ ⑤

$$\ddot{x} + \frac{3g}{l}\left(x - \frac{11l}{3}\right) = 0$$

දෝලන කේන්ද්‍රය සමතුලිත පිහිටුම වේ ⑤
එනම් අංශුව මත සම්ප්‍රයුක්ත බලය ශුන්‍ය
ලක්ෂ වේ. $\ddot{x} = 0$ $x = \frac{11l}{3}$ දෝලන

සමතුලිත විට

$$T_A = T_B$$ ⑤

$$\frac{mg(AC - l)}{l} = \frac{2mg(6l - AC - l)}{l}$$ ⑤ ⑤

$$3AC = 11l$$

$$AC = \frac{11l}{3}$$ ⑤

25

විස්තාරය යනු අංශුව ප්‍රවේගය ශුන්‍ය වන ලක්ෂ්‍යයට
දෝලන කේන්ද්‍රයේ සිට ඇති දුර වේ. එනිසා
විස්තාරය $\frac{11l}{3} - l = \frac{8l}{3}$ වේ. ⑤

25

$\dot{x}^2 = \omega^2(c^2 - x^2)$

$\dot{x}^2 = \frac{3g}{l}\left(\frac{64l^2}{9} - \frac{16l^2}{9}\right)$ ⑤

$\dot{x}^2 = 16lg$

$\dot{x} = 4\sqrt{lg}$ ⑤

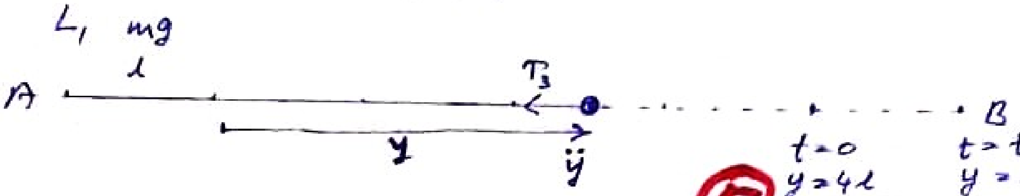
$\cos\theta = \frac{4l/3}{8l/3} = \frac{1}{2}$ ⑤

$\theta = \pi/3$ ⑤

අවශ්‍ය කාලය $= \frac{\pi - \theta}{\omega}$ ⑤

$= \frac{2\pi}{3}\sqrt{\frac{l}{3g}}$ //

25



⑤ $t = 0$, $y = 4l$, $\dot{y} = 4\sqrt{gl}$

$t = t$, $y = 5l$, $\dot{y} = \dot{y}$ ⑤

$\rightarrow F = ma$

$-T_3 = m\ddot{y}$ ⑤

$-\frac{\cancel{m}gy}{l} = \cancel{m}\ddot{y}$

$\ddot{y} + \frac{g}{l}y = 0$ ⑤ //

L₂ හි ස්වාභාවික දිගේදී

$\dot{y}^2 = \omega^2(c^2 - y^2)$ ⑤

$16lg = \frac{g}{l}(c^2 - 16l^2)$

$c = 4\sqrt{2}l$ ⑤ //

දෝලන කේන්ද්‍රය $\ddot{y} = 0$

$y = 0$ L₁ හි ස්වාභාවික දිගේ

$y = \alpha\cos\omega t + \beta\sin\omega t$ — ①

$\dot{y} = -\alpha\omega\sin\omega t + \beta\omega\cos\omega t$ — ② ⑤

$\ddot{y} = -\omega^2(\alpha\cos\omega t + \beta\sin\omega t)$ ⑤

$\ddot{y} = -\omega^2 y$

$\ddot{y} = -\frac{g}{l}y$

$\omega = \sqrt{\frac{g}{l}}$ ⑤

① න්

$4l = \alpha$ ⑤

② න්

$4\sqrt{gl} = \beta\omega$

$4l = \beta$ ⑤

$\alpha = \beta$ වේ.

B හිදී ① න්

⑤ $5l = 4l\cos\omega t + 4l\sin\omega t$

$\frac{5}{4\sqrt{2}} = \cos\omega t\cos\pi/4 +$ ⑤ $\sin\omega t\sin\pi/4$

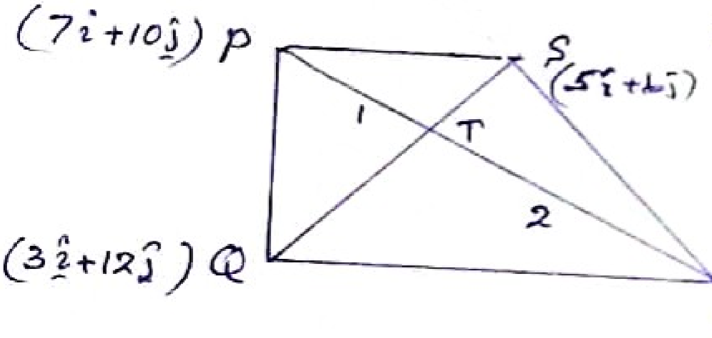
⑤ $\frac{5}{4\sqrt{2}} = \cos(\omega t - \pi/4)$

$t = \sqrt{\frac{l}{g}}\left[\pi/4 + \cos^{-1}\frac{5}{4\sqrt{2}}\right]$ ⑤ //

75

$\boxed{150}$

⑭ (a)



$$\overrightarrow{QP} = \overrightarrow{QO} + \overrightarrow{OP}$$
$$= -3i - 12j + 7i + 10j$$
$$= 4i - 2j \quad ⑤$$

$$\overrightarrow{QR} = \overrightarrow{QO} + \overrightarrow{OR}$$
$$= -3i - 12j - i + 4j$$
$$= -4i - 8j \quad ⑤$$

$$\overrightarrow{QP} \cdot \overrightarrow{QR} = (4i - 2j) \cdot (-4i - 8j) \quad ⑤$$
$$= -16 + 16 = 0 \quad ⑤$$

QP හා QR ලම්භක වේ. 20

$$\overrightarrow{OT} = \frac{14i + 20j - i + 4j}{3}$$
$$\overrightarrow{OT} = \frac{1}{3}(13i + 24j) \quad ⑤$$
$$\overrightarrow{QT} = -3i - 12j + \frac{13}{3}i + 8j$$
$$= \frac{1}{3}(4i - 12j) \quad ⑤$$
$$\overrightarrow{QS} = \lambda\overrightarrow{QT} = \frac{\lambda}{3}(4i - 12j) \quad ⑤ \text{ — } ①$$
$$\overrightarrow{QS} = \overrightarrow{QP} + \overrightarrow{PS} = \overrightarrow{QP} + \mu\overrightarrow{QR} \quad ⑤$$
$$= 4i - 2j + \mu(-4i - 8j) \quad ⑤ \text{ — } ②$$

$i \neq j$ හා $i \nparallel j$ නිසා

① හා ② න්

$((i))\quad \frac{4\lambda}{3} = 4 - 4\mu$ ⑤

$(j)\quad -4\lambda = -2 - 8\mu$ ⑤

$$0 = 12 - 12\mu - 2 - 8\mu$$
$$\mu = \tfrac{1}{2} \qquad \lambda = \frac{3}{2} \quad ⑤$$

$$\overrightarrow{QS} = \lambda\,\overrightarrow{QT}$$
$$\frac{QS}{QT} = \lambda = \frac{3}{2} \quad ⑤$$

QT : TS = 2 : 1 ⑤

50

$$\overrightarrow{OS} = \overrightarrow{OQ} + \overrightarrow{QS}$$
$$= 3i + 12j + \tfrac{1}{2}(4i - 12j)$$
$$= 5i + 6j \quad ⑤$$

QR // PS නිසාත්

$\overrightarrow{RS} = 6i + 2j$

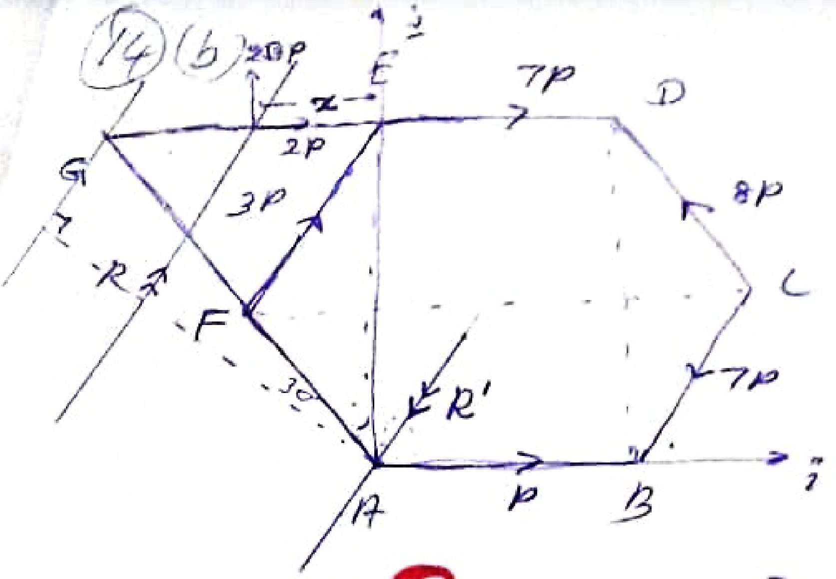
$\overrightarrow{QP} = 4i - 2j$ ලෙසින්

RS ∦ QP නොවන නිසා ⑤

PQRS ත්‍රපීසියමකි ⑤

15

⑭ (b)



$p = p\underset{\sim}{i}$ ⑤

$7p = -\frac{7p}{2}\underset{\sim}{i} - 7p\cdot\frac{\sqrt{3}}{2}\underset{\sim}{j}$ ⑤

$8p = -\frac{8p}{2}\underset{\sim}{i} + 8p\cdot\frac{\sqrt{3}}{2}\underset{\sim}{j}$ ⑤

$7p = 7p\underset{\sim}{i}$ ⑤

$3p = \frac{3p}{2}\cdot\underset{\sim}{i} + 3p\cdot\frac{\sqrt{3}}{2}\underset{\sim}{j}$ ⑤ 25

$\xrightarrow{} X = p\underset{\sim}{i} - \frac{7p}{2}\underset{\sim}{i} - 4p\underset{\sim}{i} + 7p\underset{\sim}{i} + \frac{3p}{2}\underset{\sim}{i}$

$= 8p\underset{\sim}{i} - 6p\underset{\sim}{i}$ ⑤

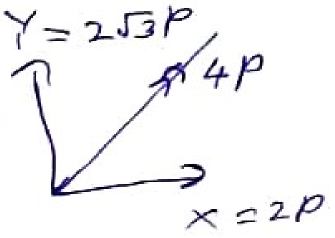
$= 2p\underset{\sim}{i}$

$\uparrow Y = -\frac{7\sqrt{3}}{2}p\underset{\sim}{j} + 4\sqrt{3}p\underset{\sim}{j} + \frac{3\sqrt{3}}{2}p\underset{\sim}{j}$

$= 2\sqrt{3}p\underset{\sim}{j}$ ⑤

සම්ප්‍රයුක්තය $R = 2p\underset{\sim}{i} + 2\sqrt{3}p\underset{\sim}{j}$

$= 2p(\underset{\sim}{i} + \sqrt{3}\underset{\sim}{j})$ ⑤



දිශාව $\tan\alpha = \frac{Y}{X}$

$\tan\alpha = \sqrt{3}$ ⑤

$\alpha = \pi/3$ BC ට සමාන්තර වේ 20

ඝූර්ණය E $\curvearrowleft$ වටා සැලකීමෙන්

$2\sqrt{3}px = (7p\cdot\frac{1}{2} - p)\sqrt{3}a + (7p\cdot\frac{\sqrt{3}}{2} - 8p\cdot\frac{\sqrt{3}}{2})a$ ⑤

$2x = \frac{5}{2}a - \frac{a}{2}$

$x = a$ ⑤

ක්‍රියාකාරීව හමු EG = a වන R ක්‍රියාව G හරහා යයි

$R' = -2p(\underset{\sim}{i} + \sqrt{3}\underset{\sim}{j})$ ⑤

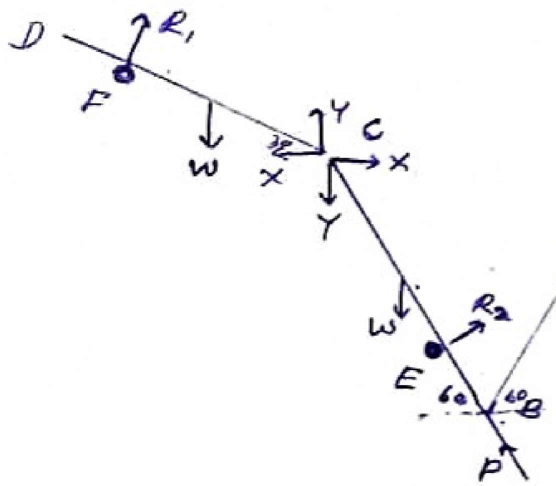
දක්ෂිණාවර්තව $\curvearrowright$ $4p\times 2a\cdot\frac{\sqrt{3}}{2} = 4\sqrt{3}pa$ ⑤

20

$\boxed{150}$

Scanned with ACE Scanner

(15) (a)



රූ ⑤

CD ට

C ↺

$W \cdot 2a \cdot \frac{\sqrt{3}}{2} = R_1 \cdot 3a$

$R_1 = \frac{W}{\sqrt{3}}$ ⑤

CD ට

→ $-X + R_1 \cdot \frac{1}{2} = 0$

$X = \frac{W}{2\sqrt{3}}$ ⑤

↑ $Y - W + R_1 \cdot \frac{\sqrt{3}}{2} = 0$

$Y - W + \frac{W}{2} = 0$

$Y = \frac{W}{2}$ ⑤

$$R = \sqrt{\frac{W^2}{12} + \frac{W^2}{4}} = W/\sqrt{3}$$

$R = R_1$ වේ ⑤

එනම් $\tan\alpha = \frac{W/2}{W/2\sqrt{3}} = \sqrt{3}$

$\alpha = \pi/3$ ⑤

BC ට B ↻

$-R_2 \cdot a + W \cdot 2a \cdot \frac{1}{2} + \frac{W}{2} \cdot 4a \cdot \frac{1}{2} - \frac{W}{2\sqrt{3}} \cdot 4a \cdot \frac{\sqrt{3}}{2} = 0$ ⑩

$-R_2 + W + W - W = 0$

$R_2 = W$ ⑤

ABC ට A ↻

$W \cdot 2a \cdot \frac{1}{2} + W\left(4a \cdot \frac{1}{2} + 2a \cdot \frac{1}{2}\right) - P \cdot 4a \cdot \frac{\sqrt{3}}{2} + R_2 \cdot a + Y \cdot \left(4a \cdot \frac{1}{2} + 4a \cdot \frac{1}{2}\right) = 0$ ⑩

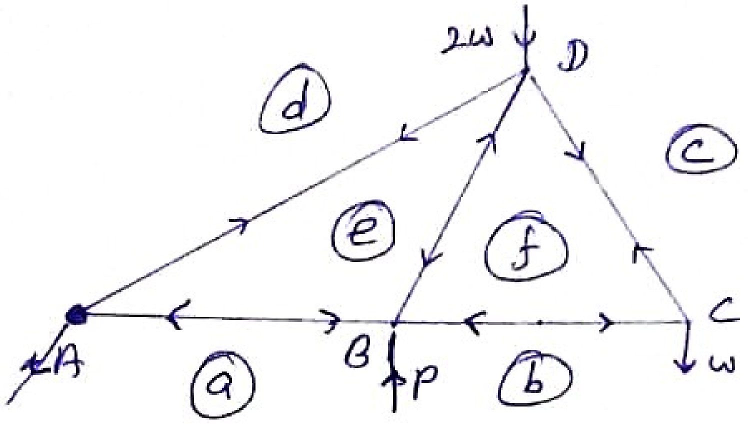
$W + 3W - 2\sqrt{3}P + W + 2W = 0$

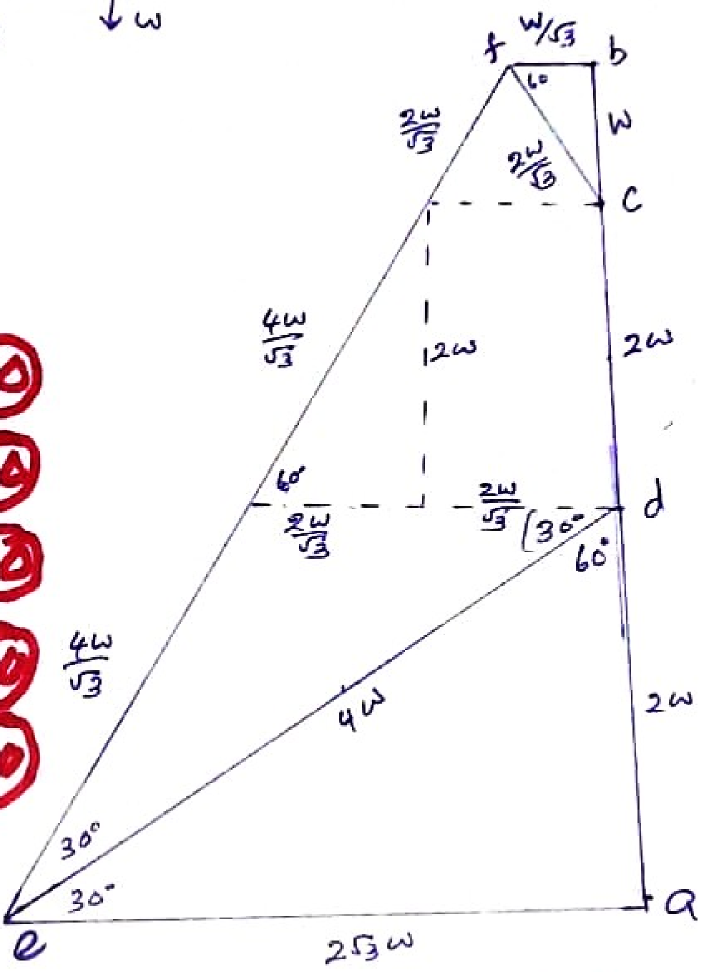
$2\sqrt{3}P = 7W$

$P = \frac{7W}{2\sqrt{3}}$ ⑤

60

(b)





දණ්ඩ	ප්‍රත්‍යාබලය		
	ආතති	තෙරපුම	
AB	×	$2\sqrt{3}w$	⑩
BC	×	$w/\sqrt{3}$	⑩
CD	$2w/\sqrt{3}$	×	⑩
DA	$4w$	×	⑩
DB	×	$10w/\sqrt{3}$	⑩

$P = 5w$ ⑤

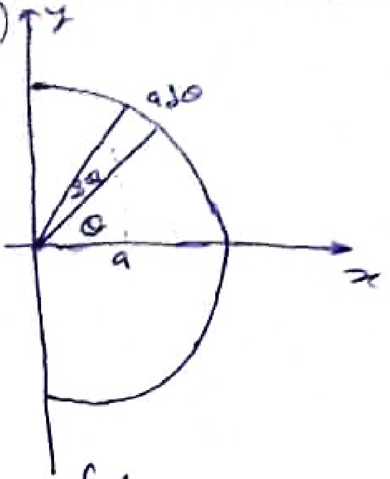
A හි ප්‍රතික්‍රියාව = ↓ 2w ⑤

B, C, D සන්ධි
සඳහා 10 බැගින්
(30)

90

$\boxed{150}$

⑯



ඒකක වර්ගඵලයක ස්කන්ධය ρ ද

ස්කන්ධ කේන්ද්‍රය $G=(\bar{x},\bar{y})$ ද

ලෙස ගනිමු.

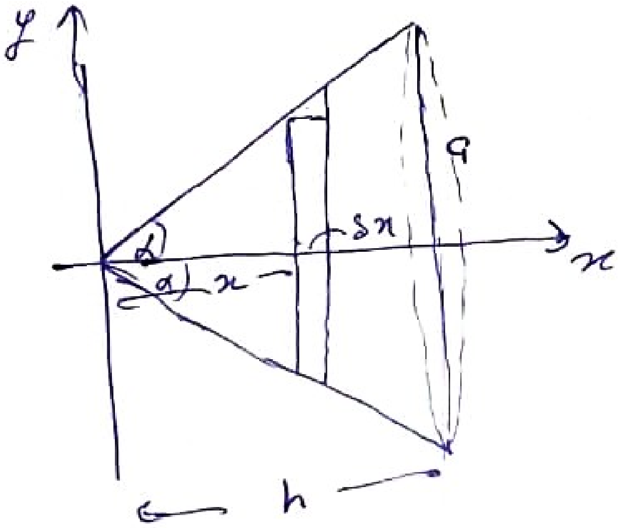
සමමිතියෙන් $\bar{y}=0$ වේ ⑤

$dm = \frac{1}{2}\cdot a\cdot a\delta\theta\,\rho$ ⑤

$x = \frac{2}{3}a\cos\theta$ ⑤

$$\bar{x} = \frac{\int x\,dm}{\int dm} = \frac{\int_{-\pi/2}^{\pi/2}\frac{2}{3}a\cos\theta\cdot\frac{1}{2}a^2\rho\,d\theta}{\int_{-\pi/2}^{\pi/2}\frac{1}{2}a^2\rho\,d\theta} = ⑤\ \frac{\frac{2a}{3}\int_{-\pi/2}^{\pi/2}\cos\theta\,d\theta}{\int_{-\pi/2}^{\pi/2}1\,d\theta} = \frac{2a\,[\sin\theta]_{-\pi/2}^{\pi/2}}{3\,[\theta]_{-\pi/2}^{\pi/2}}\ ⑤$$

$$= \frac{2a(1+1)}{3\left[\frac{\pi}{2}+\frac{\pi}{2}\right]}\ ⑤ = \frac{4a}{3\pi}\ //$$ 30



ඒකක වර්ගඵලයක ස්කන්ධය ρ ද

ස්කන්ධ කේන්ද්‍රය $G(\bar{x},\bar{y})$ ද

ලෙස ගනිමු ⑤

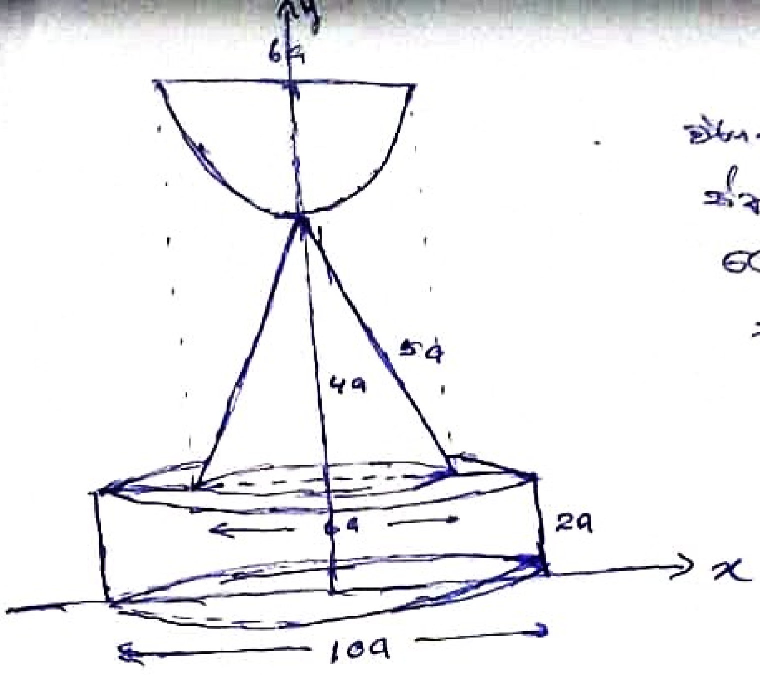
සමමිතියෙන් $\bar{y}=0$

$dm = 2\pi\cdot x\tan\alpha\cdot\sec\alpha\,\delta x\,\rho$ ⑤

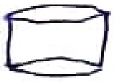
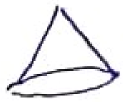
$x = x$ ⑤

$$\bar{x} = \frac{\int x\,dm}{\int dm} = ⑤\ \frac{\int_0^h x\cdot 2\pi x\tan\alpha\sec\alpha\,\rho\,dx}{\int_0^h 2\pi x\tan\alpha\sec\alpha\,\rho\,dx} = \frac{\int_0^h x^2\,dx}{\int_0^h x\,dx}$$

$$= \frac{\left[\frac{x^3}{3}\right]_0^h}{\left[\frac{x^2}{2}\right]_0^h}\ ⑤ = \frac{2}{3}\times\frac{h^3-0}{h^2-0}\ ⑤ = \frac{2h}{3}\ //$$ 30



ඒකක ඝනත්වය ρ ද
ස්කන්ධ කේන්ද්‍රය $G(\bar{x}, \bar{y})$ ද
ලෙස ගනිමු.
සමමිතියෙන් $\bar{x} = 0$ වේ. ⑤

වස්තුව	ස්කන්ධය	$\bar{y}$
	⑤ $2\pi\cdot 5a\cdot 2a\rho = 20\pi a^2\rho$	a ⑤
	⑤ $\pi(5a)^2\rho = 25\pi a^2\rho$	$2a$ ⑤
	⑤ $\pi\cdot 3a\cdot 5a\rho = 15\pi a^2\rho$	⑤ $2a+\frac{1}{3}\cdot 4a = \frac{10a}{3}$
	$\frac{1}{2}\cdot\pi\cdot(3a)^2\rho = \frac{9}{2}\pi a^2\rho$ ⑤	$6a+3a-\frac{4\cdot 3a}{3\pi}$ ⑤ $= 9a-\frac{4a}{\pi}$
	$\frac{129}{2}\pi a^2\rho$ ⑤	$\bar{y}$

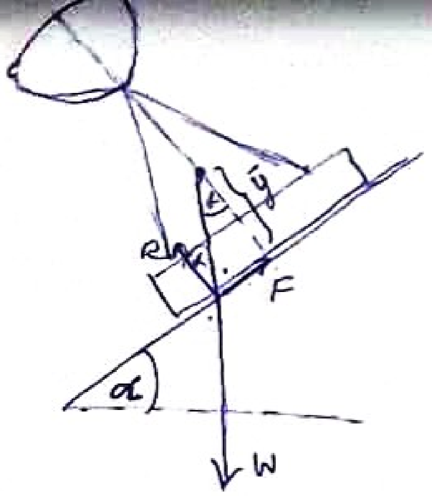
$$\frac{129}{2}\pi a^2\rho\cdot\bar{y} = 20\pi a^2\rho\cdot a + 25\pi a^2\rho\cdot 2a + 15\pi a^2\rho\cdot\frac{10a}{3} + \frac{9}{2}\pi a^2\rho\cdot\left(9a-\frac{4a}{\pi}\right)$$ ⑩

$$\frac{129}{2}\bar{y} = 20a + 50a + 50a + \frac{81}{2}a - \frac{18a}{\pi}$$ ⑤

$$\frac{129}{2}\bar{y} = \frac{321a}{2} - \frac{18a}{\pi}$$

$$\bar{y} = \frac{(321\pi - 36)a}{129\pi}$$ ⑤

70



ඝනකාය පෙරළීමෙන්
වැළැක්වීම සඳහා

$\bar{y} \cdot \tan\alpha \leq 59$ ⑤

$(321x - 36)\tan\alpha \leq 645x$ විය යුතුය. ⑤

ලිස්සා යෑමෙන් වැළැක්වීම සඳහා

$\alpha \leq \lambda$ ⑤

$\tan\alpha \leq \tan\lambda$ ⑤

$\tan\alpha \leq \mu$

20

$\boxed{150}$

(17) (a)

(i)

B - 5
W - 3
R - 2
P

B - 4
W - 2
R - 3
Q

P පෙට්ටියෙන් ගත් බෝලය රතු වීම R_1 යැයි

$P(R_1) = \frac{2}{10} = \frac{1}{5}$ ⑤

Q පෙට්ටියෙන් ගත් බෝලය රතු වීම R_2 යැයි

$P(R_2/R_1) = \frac{4}{10} = \frac{2}{5}$ ⑩

$P(R_2/R_1) = \frac{P(R_2 \cap R_1)}{P(R_1)}$ ට අනුව ⑩

බෝල දෙකම රතු වීම $P(R_1 \cap R_2) = \frac{1}{5} \times \frac{2}{5} = \frac{2}{25}$ ⑤ 30

(ii) තුන්වැනි වතාවට රතු බෝලයක් ලැබීම R_3

$P(R_3/(R_1 \cap R_2)) = \frac{2}{10} = \frac{1}{5}$ ⑩

බෝල තුනම රතු පාට වීම. $P(R_1 \cap R_2 \cap R_3) = P(R_1) \cdot P(R_2/R_1) \cdot P(R_3$ ⑩

25 $= \frac{1}{5} \times \frac{2}{5} \times \frac{1}{5} = \frac{2}{125}$ ⑤

බෝල [illegible] [illegible] විට.

$P(B_1 \cap B_2 \cap B_3) = \frac{5}{10} \cdot \frac{5}{10} \cdot \frac{5}{10} = \frac{1}{8}$ // (10)

b)

කාල ප්‍රාන්තර	f_i	x_i	$f_i x_i$		$f_i x_i^2$
0 - 2	$2p$	1	$2p$	4	4
2 - 4	q	3	$3q$	36	108
4 - 6	$3q/2$	5	$\frac{15q}{2}$	90	450
6 - 8	$2p$	7	$14p$	28	196
8 - 10	p	9	$9p$	18	162
	$5p + \frac{5q}{2}$	(5)	$25p + \frac{21q}{2}$		920 (5)

$5p + \frac{5q}{2} = 40$

$2p + q = 16$ — ① (5)

$\frac{25p + \frac{21q}{2}}{40} = 4.4$ (10)

$50p + 21q = 352$ — ②

① න් ② ට

$50p + 21(16 - 2p) = 352$ (5)

$8p = 16$

$p = 2$ (5)

$q = 12$

සම්මත අපගමනය $= \sqrt{\frac{920}{40} - (4.4)^2}$ (5) (10)

$= \sqrt{3.64}$ (5)

$= 1.91$ //

මාත පන්තිය $= 4 - 6$

මාතය $= L + \left(\frac{\Delta_1}{\Delta_1 + \Delta_2}\right)c$

$= 4 + \left(\frac{6}{6+14}\right) \times 2$ (5)

$= 4.6$ // (5)

$u = \frac{t - 10}{2}$

$t = 2u + 10$ (5)

$\bar{t} = 2\bar{u} + 10$

නව මධ්‍යන්‍යය $= 2 \times 4.4 + 10$ (5)

$= 18.8$ //

නව සම්මත අපගමනය $= 2\sqrt{3.64}$ (5)

$= 3.82$ //

නව මාතය $= 2 \times 4.6 + 10$ (5)

$= 19.2$ //

85

150